

And now let us turn to the main function of this developing system, which is to drive the blood in continual sequence past tissues that contribute to it and tissues that abstract from it certain chemical materials, and let us select the main incident, namely, the carriage of oxygen from the lungs to other parts. That this is a main incident is clearly shown by the fact that the red corpuscles which form so important a feature in the structure of blood are formed in a number directly equivalent to this demand, that the blood should be capable of transferring a certain quantity of oxygen. Thus if these structures are lost by hæmorrhage, or rendered less efficient by the presence of carbon monoxide, or when circumstances for the acquisition of oxygen are peculiarly difficult, as on high altitudes, their formation is proportionally accelerated. That negative pressure of oxygen governs blood-production is a statement which will bear some inspection.

Now here we have a function which for its perfect performance is dependent upon another machine, the respiratory mechanism, which in its turn is governed by a different but correlated factor, namely, the carbonic-acid pressure in the blood. In this case we may say that the positive pressure of carbonic acid dominates the quantity of the respiratory activity. It is well known now that this statement has been set on firm ground.

It is interesting, then, to observe how these two mechanisms are brought into exact correlation by the simple fact that the lung surface, a portion of the respiratory mechanism, is formed accurately to a measure provided by the volume of blood dispatched from the heart, and therefore probably by that second growth of blood-tissue which I have spoken of as due to pressure from the heart. The surface of the lungs is some eighty square metres. The heart at each stroke sends into the lungs somewhere about 100 cubic centimetres of blood containing red corpuscles within a total surface also of eighty square metres. Here, then, we have a mechanical link connecting these mechanisms that is obviously forged by an incident of use.

Within the central nervous system, where development mainly affects the shape and distribution of structures rather than their chemical quality, affecting thus what we might call the geography of the system, interesting geographical facts attest to the same forged linkage of mechanisms. Thus, for example, we have the so-called "sympathetic system," offering at first view a curious anomaly to the more usual, somewhat segmental, distribution of nerve-fibres, since from the region of the cord related to the trunk of the body nerves pass through this system to control tissues placed in the head and in the limbs. This anomalous geographical fact is, however, at once explained when we regard the part played by this sympathetic control in the several parts of the body as merely subservient to the interests of locomotion. Under its influence the eye is set for out-of-door, or, if I might say it, for out-of-cave, vision. The heart is accelerated. The glandular organs, with the exception of those useful in times of much exertion and heat production, like the sweat glands, are set at rest, or else the motor organs of special importance in their sphere of influence are quietened. Regarding the matter in this light, there is an obvious convenience of geographical fact in the situation of this instrument midway between those parts of the central nervous system that are swept at this very time by nervous impulses dominating the movements of the limbs, just as there is some convenience in the chemical linkage which has been discovered between the different parts of this sympathetic system that further tends to permit their unison of activity.

On the other hand, when the muscles are at rest and the condition of the body is of the indoor description, the eye is set for close vision, and various glandular organs are allowed to conduct their functions under the influence of nervous mechanisms placed at some distance from the disturbing centres of nervous activities that are used in locomotion.

Doubtless this useful distribution of parts within the nervous system must find an explanation in the same terms as must the dynamic anatomical relation to which I have drawn attention as linking up the respiratory and

circulatory systems, namely, the fact that the heart sweeps past the surface of the lungs at each stroke red corpuscles that have the same extent of surface as the lungs. In both cases it is true that the right adjustment of the several parts of this machine has been arrived at as a consequence of use, and that these mechanical linkages are due to circumstances of a purely physical and chemical nature.

In conclusion, I might say that these instances have been selected to illustrate my opinion that some of the experiments of greatest interest to physiology are in process of conduction within the normal body, and are to be observed by records imprinted on its structures. In feeling for the keys whereby each set of records may be interpreted, it is necessary that someone should frankly attempt to assign a definite meaning to every incident of structure. That this attempt should be limited by precise thinking goes without saying, and I may be allowed the hope that my transgression outside the realms of precision have not been beyond the tolerance of this section of the British Association for the Advancement of Science.

NOTES.

A DEPARTMENTAL committee (consisting of Mr. Angus Sutherland, C.B., chairman, Mr. J. E. Sutherland, M.P., Mr. H. M. Conacher, Dr. T. Wemyss Fulton, and Mr. J. Moffatt) has been appointed by the Secretary for Scotland to inquire into and report upon the character and national importance of the inshore and deep-sea fisheries of Norway and other countries engaged in the North Sea fisheries, and the efforts made for the development of the fishing and fish-curing industry in all its branches, including (1) the systems of fishery administration, including the constitution and function of the local committees formed for this purpose in Norway and of any similar organisations in the other countries; (2) the facilities provided for research and for educating and training those engaged in these industries, by the establishment of technical schools, museums, laboratories, classes, or other special facilities; (3) the nature of the various means of capture employed and the methods (including any use of State credit) by which fishermen obtain the necessary capital to maintain the efficiency of their vessels and equipment; and to report in regard to each of the foregoing matters whether it would be advisable for similar action to be taken, with or without modifications, in the case of the Scottish fishing industry, and, if so, what means should be adopted.

REUTER messages from Catania state that frequent earthquake shocks, some of which were fairly severe, have been recorded at the Etna Observatory. The records in the seismic apparatus are reported to be almost continuous and very distinct. The volcano is throwing up dense clouds of smoke, and a rain of cinders is falling as far as Catania. There is also a broad stream of lava, which is destroying the vineyards in its path.

ON Saturday, September 9, the aerial post was inaugurated by Mr. Gustav Hamel, one of our most brilliant flyers, who carried a sack of letters in a Blériot monoplane from Hendon to Windsor in thirteen minutes. Starting at five minutes to five in the afternoon, he arrived at his destination, nineteen miles distant, at 5.8, so that his speed, the wind being behind him, was about 105 miles an hour. The other aviators who should have started were prevented by the thirty-mile wind, and no further deliveries took place until Monday, when Messrs. Greswell and Driver carried six mail-bags over in the early morning. M. Hubert, in an effort to follow, had a bad fall, damaging his machine and severely injuring himself. The affair has aroused great interest, so much so that it is as well to sound a word of warning and say that the *aéroplane* post is neither

practical, useful, nor economical. Letters can be sent far more cheaply, trustworthily, and conveniently by train or motor-van, and it is to be expected that these conditions will continue for the next half-century at least. From a philanthropic point of view the post has been a success, large sums having been received by the sale of letters and postcards, which are to be devoted to charity; but from the aeronautical point of view it proves nothing and promises nothing. Besides, it is unthinkable for very many years to come that we should put good aviators to the menial task of carrying mails regularly.

THE Zeppelin airship *Schwaben* made a successful non-stop flight on September 6 from Baden Baden to Gotha by way of Frankfurt-on-the-Main. It left Baden at 6.10, and descended at Gotha at 12.30, covering a distance of about 200 miles. It carried seven passengers in addition to the pilot. On September 9 it flew from Gotha to Berlin, and on September 12 it carried eight passengers from Gotha to Düsseldorf.

PARTICULARS are given in *The Times* of the anthropological research expedition to the islands of Normanby, Fergusson, and Goodenough, in British New Guinea, funds for which are being provided out of the Oxford University common fund and by several of the colleges. The work has been undertaken by Mr. David Jenness, of Balliol College, who proposes, unaccompanied, to spend a year amongst people who are admittedly cannibals. Mr. Jenness started on his journey last week. It is stipulated by the University, in contributing to the expedition, that the University museum shall have the first offer of articles of interest which may be obtained. Assistance has been promised by the missionaries on Goodenough Island, including the use of a boat and native oarsmen. The first few weeks will be spent in cruising around the islands endeavouring to get on friendly terms with the people and in studying the trade relations, after which Mr. Jenness hopes to settle down for some time; later he will proceed on a mission boat to Rossell Island, at the eastern end of the Louisiade Archipelago, to study some ethnological problems concerning the relationships of Oceanic peoples. Mr. Jenness has been provided with the latest scientific instruments, including a phonograph for recording native songs and speech.

A PRELIMINARY announcement with reference to the eighth International Congress of Applied Chemistry, which is to be held in Washington, D.C., U.S.A., on September 4, 1912, and in New York on September 6 to 13, 1912, has been sent to us. We learn from it that the sections will be devoted to the following subjects:—(1) analytical chemistry; (2) inorganic chemistry; (3a) metallurgy and mining; (3b) explosives; (3c) silicate industries; (4) organic chemistry; (4a) coal-tar colours and dyestuffs; (5a) industry and chemistry of sugar; (5b) indiarubber and other plastics; (5c) fuels and asphalt; (5d) fats, fatty oils, and soaps; (5e) paints, drying oils, and varnishes; (6a) starch, cellulose, and paper; (6b) fermentation; (7) agricultural chemistry; (8a) hygiene; (8b) pharmaceutical chemistry; (8c) bromatology; (8d) physiological chemistry and pharmacology; (9) photochemistry; (10a) electrochemistry; (10b) physical chemistry; (11a) law and legislation affecting chemical industry; (11b) political economy and conservation of natural resources. Further particulars of the prospective arrangements of the congress may be obtained from the secretary, 25 Broad Street, New York City, U.S.A.

THE autumn meeting of the Institute of Metals will take place at Newcastle-on-Tyne on September 20 to 22,

and the reading of the undermentioned papers has been arranged for:—the corrosion of brass, with special reference to condenser tubes, by Mr. P. T. Brühl; further note on the nature of solid solutions, by Mr. C. A. Edwards; the electrical conductivity and constitution of alloys, by Dr. W. M. Guertler; volume changes in the alloys of copper with tin, by Mr. J. L. Haughton and Prof. T. Turner; non-ferrous metals in railway work, by Mr. G. Hughes; the failure of a brazed joint, by Prof. H. Louis; the mechanical properties of hard drawn copper, by Mr. D. R. Pye; the alloys of aluminium and zinc, by Dr. W. Rosenhain and Mr. S. L. Archbutt.

WE learn from *Science* that the third National Conservation Congress will be held in Kansas City on September 25 to 27. It will be remembered that the general objects of the congress are to provide for the discussion of the resources of the United States as the foundation for the prosperity of the people; to furnish definite information concerning the resources, and their development, use, and preservation; to afford an agency through which the people of the country may frame policies and principles affecting the conservation and utilisation of their resources, to be put into effect by their representatives in State and federal Governments.

THE third congress of the International Society of Surgery will take place in Brussels on September 25 to 29, and a lengthy programme of papers to be read and discussed has just been issued.

At the meeting of the Astronomical and Astrophysical Society of America, held at the Dominion Observatory, Ottawa, on August 23 to 25, Prof. E. C. Pickering was re-elected to the presidency and Prof. Hussey to the secretaryship. The next annual meeting is to take place in August next at the Allegheny Observatory, Pittsburg.

It is announced in *Science* that Mr. Arthur A. Allen, instructor in neurology and vertebrate zoology in Cornell University, is to spend next year in South America as chief of an expedition organised by the American Museum of Natural History. The expedition will go to Colombia, its immediate object being to explore ruins and collect antiquities.

THE New South Wales Government, in consequence of the efforts of Prof. Edgeworth David, F.R.S., has granted the sum of 7000*l.* towards the cost of Dr. Mawson's Antarctic expedition. The amount subscribed locally has now reached 19,100*l.*

THE sum of 500*l.* a year for two years has been given to the Sheffield City Council by Mr. Douglas Vickers to cover the cost of a trial of the tuberculin treatment for consumptives, and Dr. Chapman, formerly of the Sheffield Infirmary, has been appointed to superintend the treatment.

THE twenty-sixth annual congress of the Incorporated Sanitary Inspectors' Association met at Yarmouth last week under the presidency of Sir James Crichton-Browne, F.R.S., who in his opening address made the following remarks on the subject of tuberculosis:—For all practical purposes the identity of human and bovine tuberculosis is established, and we can hold fast to the faith which had been unquestioned until Koch launched his thunderbolt—the explanation of which was afforded by the Royal Commission report. It was the difficulty he experienced in communicating human tuberculosis to calves, cattle, and pigs, whether by injection or feeding, that led Koch to conclude, too hurriedly, that human and

bovine tuberculosis were specifically different. The fact of the comparative immunity of calves, cattle, and pigs to human tubercle bacillus enabled them to realise how much they were indebted to the labours of the Royal Commission. It misled Koch; it would have misled many less experienced investigators; and but for the appointment of the commission there would have been a series of repetitions of Koch's experiments under restricted conditions and an accumulation of testimony that he was quite right in declaring that bovine and human tuberculosis were distinct diseases, followed by a mischievous relaxation of the measures directed to prevent the communication of bovine tuberculosis to human beings and the loss of innumerable lives. The commission fulfilled its mission, and there is now irrefragable evidence that mammals and man can be reciprocally infected with tuberculosis, with the prospect of the introduction of stringent administrative measures for preventing the propagation of tuberculosis among human beings by means of food. Bovine animals are only comparatively, not completely, immune to the human tubercle bacillus, and human beings are notably susceptible to the bovine tubercle bacillus, which produces in them even the pulmonary forms of the disease. He went on to emphasise the necessity of general legislation, applicable to the whole country, to cope with the evil of tuberculous milk supply.

SEPTEMBER this year is proving exceptionally warm, and the record summer is extending its influence into the early autumn. On seven days out of the first twelve in September the shade temperature at Greenwich has exceeded 80°, which brings the total days with 80° and above to forty-four for the summer so far, which is four more than any previous record during the last seventy years. The average maximum temperature for the first eight days of the month is 2° higher than any previous record for the same period. The maximum temperature at Greenwich on September 7 was 92°, and on September 8 94°; the latter is 2° higher than any previous temperature so late in September. There have already been seven days during the summer with the temperature above 90°, and 1868 is the only other summer in the past seventy years with an equal number of hot days. The aggregate rainfall at Greenwich from July 1 to September 12 is 1.62 inches, which is 30 per cent. of the average, and rain has only fallen on twelve days. When a complete discussion is made of the very remarkable summer, it will be full of interest.

THE Parliamentary report of the Meteorological Committee for the year ended March 31 shows that the business has been exceptionally important; the office was transferred to South Kensington, where a museum of instruments and objects of interest, and a small physical laboratory, have been provided. The transfer to the committee of the administration of the Kew Physical Observatory and of the magnetic observatory at Eskdalemuir (to which we have before referred) was carried out. In addition to many useful official publications, we note that Dr. Shaw has completed a book (more particularly for the use of aeronauts) on "Forecasting Weather," which embodies the results of the work of the office in connection with dynamical meteorology during the last ten years. The reports of the operations of all the various departments exhibit great activity. Upwards of 3000 registers of various classes relating to the meteorology of the ocean were received. The information has been utilised in the preparation, *inter alia*, of the monthly meteorological charts of the North Atlantic and Indian Oceans (to which

we have frequently referred). Considerable improvements have been made in the maps and tables of the Daily Weather Report; several stations in or near London are now included in a separate table. The usual forecasts have been supplemented by a "further outlook" giving the prospects for a longer period when practicable. The success of these and of the usual forecasts and storm warnings during the year was very satisfactory; wireless telegrams from the mercantile marine were generally received too late for the chart of the current day, but were nevertheless frequently of great assistance to the forecaster. The investigation of the upper air by kites and balloons has been regularly carried on; a systematic attempt was made to ascertain the effect of solar radiation on the instruments, &c. The result, so far as it goes, is said to show that distinctly higher temperatures are recorded while the sun is shining.

To the first part of the *Bergens Museums Aarbok* for 1911 Captain H. Negaard contributes a paper on the earliest population of the Hardanger Field district of south-western Norway, with descriptions and illustrations of their works, weapons, and implements. Among the former, the abundance of remains of Megalithic structures of the Stone Age is specially noticeable. In a second paper Mr. J. A. Grieg records the vertebrate remains found among these "boplader," which include those of trout, ptarmigan, willow-grouse, plover, reindeer, and lemming.

DR. FLORENTINO AMEGHINO emphasises his views on early human development in South America in a paper entitled "La antigüedad del hombre en la República Argentina" (*Atlántida*, tomo iii., 1911). The stratigraphical studies of Wilckens are quaintly described as formed in the cabinet during "un acceso de ameghinofobia aguda." The paper is mainly an answer to the work of A. Mochi in the *Archivio per l'antropologia*, in which the age of the beds containing human remains is held to be in accord with what is known in Europe, while doubt is thrown upon the materials brought as evidence from underlying strata. Ameghino claims certain diminutive eoliths from the South American Eocene as having been fashioned by the precursors of man. His general position is that Argentina may be able to show what European stratigraphy fails to prove, and this, of course, no scientific geologist can overlook.

IN an article on the adaptation of the Primates, published in *The American Naturalist* for August, Prof. F. B. Loomis expresses the opinion that the group, of which the earliest known representatives are the Lower (Wasatch) Eocene Anaptomorphidae and Notharctidae, originated in the forest tract north of Hudson Bay, which then enjoyed a tropical climate. "From this ancestral centre the first Primates, along with other groups, migrated in all directions possible. . . . This opened three paths, one south into America, a second south-easterly into England and France, and a third south-westerly into Asia, thence ever southerly across China and India and along the Indo-Madagascar isthmus (or chain of islands) to Madagascar and Africa." At an early date the group became differentiated into fruit-eaters (Anaptomorphidae, followed by the modern Tarsiidae) and general feeders (Notharctidae—giving rise to the tropical American Cebidae—and the European Adapidae, from which are derived modern Old World apes and monkeys, while a side-branch gave rise to lemurs). The Cebidae probably reached their present home from the north during the Eocene, while the Old World Primates travelled from America *via* Bering Strait, and made their way south through eastern Asia to Madagascar and

Africa, reaching England in the Upper Eocene. "With the close of the Eocene the first adaptive radiation of the Primates was complete, and they had achieved an almost world-wide distribution. At the end of the period the North American contingent was extinct, the South American group was isolated, the Asiatic and African forms were scattered on islands and on the African continent, and the European contingent was located in central and southern Europe . . . and it is among these that the next act in the great primate drama took place." To follow the views of the author on this point would take too much space, but it may be mentioned that he adopts the opinion as to the Asiatic origin of the man-like apes and man, considering the Fayum forms described by Schlosser as being probably referable to the Cercopithecidae. In conclusion, it may be observed that the views of Mr. Loomis differ essentially from those of Dr. Standing (Trans. Zool. Soc., 1908), who believes American monkeys and lemurs to have been differentiated in an equatorial continent connecting Africa with South America.

VOL. vi., No. 15, of the University of California Publications in Zoology contains a contribution (pp. 353-468, pls. 33-48), by Edna Earl Watson, on the unsegmented cestode *Gyrocotyle*, which is parasitic in the spiral valve of certain chimaeroid fishes. The history, occurrence, and gross anatomy of the genus are considered, the distinctive characters of the four known species are pointed out, and the morphology and histology of the systems of organs described. The intermediate host and life-cycle of *Gyrocotyle* are still unknown. Interesting observations are presented on the functional orientation of this parasite. The acetabulum is directed anteriorly, and its exploratory function is strongly in evidence; it never acts as an organ of fixation. The rosette is posterior, and functions strictly as an organ of attachment. Near the acetabulum is a pair each of sensory pits and papillae abundantly innervated from the neighbouring portion of the central nervous system, which the author regards as corresponding to the "brain" of a turbellarian. The rosette portion of the nervous system, developed in connection with the powerful posterior organ of attachment, is comparable with the posterior ring commissure in the posterior sucker of a heterocotylean trematode. The rosette of *Gyrocotyle* is a true scolex, in structure and function, and corresponds to that organ in the segmented tape-worms. On the basis of this and other evidence, the scolex of a cestode is regarded as a posteriorly situated organ of attachment, the "neck" or growing region as the ante-penultimate region, corresponding to the growing zone in annelids, and the proglottis as the intermediate region of the body. According to this view, the anterior end in the tape-worms has disappeared.

PART i. of vol. ii. of the entomological series of Indian Forest Memoirs, by Mr. E. P. Stebbing, contains a detailed account of the pests of the Deodar, and some sketches of the insects that have been observed to prey upon some of these pests, which should be extremely useful to forest officers of every grade. The number of pests, mostly from the Deodar forests of the N.W. Himalaya, which the author discusses, include fourteen species of beetles, six species of lepidopterous caterpillars, and two saw-fly caterpillars, the majority of which are specifically identified, those that are not named being sufficiently described and figured for recognition by the forest conservator. Among the injurious beetles, three species of Scolytus, which are regarded as destructive above all others in the area specified, are said to be quite peculiar to the Deodar. Of insects that attack some of the

commoner of the pests, four parasitic Hymenoptera and three predaceous beetles are mentioned, and are duly extolled according to the modern optimistic fashion. The plan of the memoir is good. Each species, so far as the present state of knowledge allows, is described and figured in the several stages of its existence, in the more important phases of its activity, and in its local and constitutional effects upon the tree. Damages also are adjudged, and treatment is suggested.

IN addition to giving an account of the work and progress of the society for the year 1910-11, the seventy-eighth annual report of the Royal Cornwall Polytechnic Society contains a short but excellent life, by Mr. F. H. Davey, of the later C. W. Peach, accompanied by a portrait. Peach, who did so much for the geology and natural history of Cornwall, as well as for other parts of the United Kingdom, was born in 1800 and died in 1886. Occupying an ordinary post in the coast guard service, and entirely self-educated, he is credited with having made during the first half of the nineteenth century probably more additions to the Cornish marine fauna than any naturalist except W. P. Cocks.

PURSuing Prof. Brandt's argument that the distribution of plankton is correlated with the activity of denitrifying bacteria, Mr. B. Issatschenko reports in the *Bulletin du Jardin Impérial Botanique*, St. Petersburg (vol. xi., part iii.), the results of cultivating bacteria from samples of water taken from the Black Sea. Two new species of Bacterium were thus obtained, the one an active denitrifying organism, the other only capable of decomposing nitrites. Similarly, Dr. Parlandt describes the action of three denitrifying species cultivated in water from the Baltic Sea.

A BRIEF summary of the leading facts connected with graft hybrids is contributed by Mr. R. P. Gregory to *The Gardener's Chronicle* (September 2 and 9). Although the subject is discussed by Charles Darwin in "Animals and Plants under Domestication," the nature of these vegetative hybrids has remained obscure, and systematic attempts to produce other specimens failed until Prof. H. Winkler managed to raise composite forms from grafts of tomato and black nightshade. A striking feature of the hybrids thus obtained was the development, side by side on the stem, of the stiff hairs and divided leaves of the tomato with the smooth exterior and simple leaves of the nightshade, a phenomenon to which Winkler gave the name of "chimæra"; the explanation is found in the juxtaposition of meristematic tissues derived from each plant. Generally it has been observed that tissue development proceeds in parallel lines, *i.e.* periclinally; thus in *Crataego-mespilus Asnieri*—as illustrated—the epidermis is that of the medlar, while the internal tissue is that of *Crataegus*, and *Cytisus Adami* presents the appearance of *Laburnum vulgare* clothed in an epidermis of *Cytisus purpureus*.

MR. E. F. SMITH directs attention to the striking resemblances between "crown-gall," an affection of plants, and malignant animal tumours, especially sarcoma. It is inoculable on to healthy plants, reproducing the disease. In the "tumours," both primary and those obtained by artificial inoculation, a bacterial organism (*Bacterium tumefaciens*) is present, which can be isolated and cultivated, and the pure cultures reproduce the disease on inoculation (Circular No. 85, 1911, Bureau of Plant Industry, U.S. Department of Agriculture).

IN *The Museums Journal* (vol. x., No. 12, June) Mr. E. E. Lowe, of Leicester, continues a description of models to show the optical properties of rock-forming minerals.

We should prefer to place the models illustrating the crystal-systems on a lower shelf, rather than to tilt some of them in order to show their lateral axes. The features of the optical indicatrix are well illustrated by hoops and wires. The explanations of the models serve as an introduction to the examination of mineral-slices with the polarising microscope; but we may prefer the generalised diagrams of Groth to those here given for a special case. There seems an arrow-head too many in one of the figures; and we doubt if Mr. Lowe's model has, as he states, the short diagonal of the analysing nicol "inclined towards the observer at an angle of 45° with the horizontal plane."

For several years past the Aire and Calder Navigation Company has been improving the navigation along the system of canals between Goole and Leeds by deepening and widening the water-way; and in consequence the traffic has been very largely increased, rendering Leeds an inland port on a small scale. Recently a steamer 80 feet long reached Leeds from the docks at Hull in nineteen hours.

An automatic stabiliser, recently invented by M. Dautre, has been used with partial success on a Farman biplane in France, where it has aroused considerable interest. It is designed solely for preserving fore-and-aft equilibrium, and one of its most interesting results is to give the machine to which it is fitted its best angle of glide independently of the pilot's control. The apparatus consists of two parts, an anemometer and what is termed an "accelerometer." The former is a plate placed normally to the air-flow, and backed by two springs of such a strength that the pressure on the plate, when the machine attains its mean speed, entirely compresses them. The forward motion of the plate resulting from any diminution of the wind-pressure depresses the elevator through the agency of a piston operating by compressed air. The "accelerometer" consists of two movable and relatively heavy cylinder-heads, each sliding on a rod placed end on to the flight-path, which move under inertia whenever the speed of the machine diminishes or increases, and operate the elevator in a similar way to the anemometer. These cylinder-heads are held at each end by springs, which return them to their initial position when the aeroplane progresses at a uniform speed, and also check their movement when the machine pitches without speed variation. Both the accelerometer and the anemometer have been combined in one instrument by the inventor, and experiments in calm weather proved that the machine could safely fly for several seconds uncontrolled.

An interesting article on engineering problems in Nicaragua, by Mr. T. Lane Carter, appears in *The Engineering Magazine* for August. As few countries have such a rainfall as one finds in Nicaragua, irrigation is not one of these problems. At Greytown, at the mouth of the San Juan River, the rainfall is about 300 inches per annum; in the mountains, where the gold mines are situated, the rainfall varies from 100 to 125 inches per annum. With rainfall and soil such as they have in Central America, it is not surprising that the vegetable growth is rapid. Two and a half crops of corn can be raised per year. Sugar-cane will produce there for seven or eight years, and does not need an annual planting, as in Louisiana. But the agricultural engineer will find a great deal to occupy his attention in Nicaragua. In the eastern part of the country agriculture is in as backward a condition as in the days of Columbus. Take, for instance, the usual method there of planting corn. A patch is selected in the forest, and the trees and bushes felled.

No attempt is made to clear away the rubbish. A man goes round with a sharp, pointed stick, pokes holes in the ground wherever he can find a place amongst the debris, drops in a few seeds, and leaves the crop to nature's care. There is no hoeing or cultivating done. The corn must fight out its battle unaided by man. Strange to say, the crop is gathered in about eight weeks.

A LEADING article in *Engineering* for September 1 deals with the recent investigation on the stress distribution in a plate pierced with a hole and subjected to pull, which has been ably carried out by Dr. K. Suyehiro, of the Department of Naval Architecture, Tokio University. Strictly speaking, the solution appertains only to the ideal case of a plate pierced at the centre and extending to infinity in all directions; this is assumed to be subjected, in one direction only, to tension, the distribution of which is uniform at an infinite distance from the origin. Dr. Suyehiro then works out what the distribution of stress is in the immediate neighbourhood of the hole, and finds that the maximum value of the stress is no fewer than three times that of the average value. If there were any real analogy between stream-lines and stress-lines, the maximum stress, he points out, would be double the mean. Dr. Suyehiro also shows that local concentrations of stress have practically vanished at points distant from the centre of the hole by $1\frac{1}{2}$ radii; hence his result is applicable to quite narrow plates. He has also compared the results of his calculations with direct experiments on a strip of india-rubber, and finds remarkably close agreement. In view of the importance of the fact that a ship's deck is under push and pull alternately, a useful investigation might be made on the elastic breakdown and final rupture of a wide bar pierced with a hole and subjected to alternating stresses of push and pull. The original paper is reprinted in full in the issue of *Engineering* already quoted.

OUR ASTRONOMICAL COLUMN.

KIESS'S COMET, 1911b.—No. 4522 of the *Astronomische Nachrichten* contains a new set of elements calculated by Dr. H. Kobold for comet 1911b, also a number of observations of the comet. The observations, made about the middle of August, are somewhat uncertain, owing to the difficulty of the object, and Senor Marisonza reports from Rio de Janeiro that during August 18–20 the brightness had rapidly decreased; he states that it could not be observed there after August 24. The ephemeris computed by Herr A. Kobold shows that the present magnitude should be about 8.6, and the position for September 14 is 18h. 15.3m., $-45^\circ 24.1'$; the comet is now nearly stationary in Corolla, immediately north of α Telescopium.

MERIDIAN CIRCLE OBSERVATIONS.—From the Harvard College Observatory we have received vols. lxxv. and lxxvi. of the *Annals*, embodying the journal of the zones observed with the 8-inch meridian circle during the years 1888–90 and 1890–8 respectively. The observations were made and the volumes prepared by Prof. Searle in the preparation of a catalogue which is to appear in vol. lxxvii. of the *Annals*; a previous publication, vol. lxxii., part i., dealt with the fundamental stars employed in the same zone, viz. $-9^\circ 50'$ to $-14^\circ 10'$.

BROOKS'S COMET, 1911c.—The brightness of Brooks's comet, 1911c, continues to increase, and during the fine nights recently experienced at Portsmouth many British Association visitors who are not astronomers found no difficulty in distinguishing the comet from the surrounding stars merely by naked-eye observations. According to the supplement to No. 4522 of the *Astronomische Nachrichten*, Dr. Schiller reports that on August 29 the comet was about half a magnitude fainter than the Andromeda nebula. Its nucleus, formerly sharply stellar, had become diffuse, and in a bright red field was well seen. Dr. Ebell found that on August 26 the brightness of the comet was comparable